

Injection Indicator Diseases: Bacterial and Viral Infections That Indicate Injection Drug Use in a Community Hospital Setting

C Sittambalam, R Ferguson

Citation

C Sittambalam, R Ferguson. *Injection Indicator Diseases: Bacterial and Viral Infections That Indicate Injection Drug Use in a Community Hospital Setting*. The Internet Journal of Public Health. 2010 Volume 1 Number 2.

Abstract

Certain infections can be strongly suggestive of injection drug use and thereby used as markers of such behavior. A retrospective cohort study of patients admitted between September 2003 and May 2007 with a history of prior and/or current substance use was undertaken to determine whether findings in our inner city population differed from existing data. The 1799 patients had 2531 hospital admissions with evidence of cocaine and/or heroin use. The average age was 45 years, with an age range of 16-79 years old. Cocaine-only use was reported twice as frequently (n=906, 36%) as heroin-only use (n=456, 18%) and 190 (69%) of the heroin-only users injected whereas 96 (19%) of the cocaine-only users injected. Of the 882 injection drug users, 597 (68%) had one or more viral diseases, whereas 285 (32%) had none; 491 (55%) had Hepatitis C, 102 (11%) had Hepatitis B, and 304 (34%) had HIV. Suppurative back infections were found in 22 patients, 41 had endocarditis with or without septic emboli, 44 had deep abscesses not related to local injection or spinal infection, 12 had septic arthritis, and 144 had generalized bacteremia/ sepsis. In the setting of an inner city community hospital, the presence of injection drug use appears to represent the highest risk of associated viral and bacterial infections. These infections could be denoted as "Injection Indicator Diseases".

BACKGROUND

According to the 2009 National Survey on Drug Use and Health, 21.8 million Americans aged 12 or older were current illicit substance users with 617,000 persons aged 12 years or older having tried cocaine for the first time during the year; 180,000 had tried heroin¹. In many inner cities, abuse of cocaine and heroin is a well-known and widespread problem. In Baltimore Maryland, cocaine use grew from 9,433 self-reported cases to 13,669 cases between 1999 and 2003; heroin use increased from 12,040 self-reported cases to 17,309 during the same time frame². The number of hospital admissions in Baltimore City related to illicit drug use rose from 18,064 in 1999 to 24,765 in 2003². This increase is clearly an important health care concern because of the numerous medical complications potentially associated with illicit drug use.

The consequences of illicit drug injection practices can be devastating. Bacterial infections due to injection drug use, especially skin and soft tissue infections and bacteremia, are the most common reason for emergency room visits and subsequent hospital admissions among the drug-using

population^{3,4,5}. According to the Drug Abuse Warning Network's (DAWN) National Estimates of Drug-Related Emergency Department Visits report, in 2008 there was approximately 2 million emergency room visits due to medical emergencies caused by drug misuse or abuse; 993,379 (49.7%) of these visits were due to illicit substance use⁶. Studies have also shown that with longer durations of injection drug use, the chance of acquiring Hepatitis B, Hepatitis C, and HIV increases⁷.

We suspect that admissions to our hospital for illicit drug use, especially via injection practices, were associated with a high incidence of serious bacterial and viral infections. Therefore our aim was to determine the incidence of viral and bacterial infections in illicit drug users. We also studied the demographics of patients admitted for illicit drug use and infection to assist in efficient diagnoses in our busy internal medicine service.

METHODS

A retrospective cohort study of patients with a history of substance use was undertaken. Monthly billing records and electronic medical record data were used to assemble a list

of patients that had been identified as an illicit substance abuser of heroin and/or cocaine. Medical records of patients who were admitted to our institution's internal medicine service between September 2003 and May 2007 with either current or past drug use were analyzed. Billing records were used to indicate patients with a discharge diagnosis of illicit substance abuse. Medical record numbers were used to find the patient's medical records in the electronic medical record database.

These records were then screened to look for a history of any past or present drug use by using dictated notes from the hospital stay, emergency room admission paperwork, history and physicals, and laboratory data. Any current use (within the week prior to admission) was verified by patient disclosure of use and/or drug toxicology screening upon presentation to the Emergency Department. This included patients self-admitting to using heroin and/or cocaine and urine toxicology studies positive for heroin and/or cocaine. Demographic characteristics including patient age, sex, and race were collected. Detailed information regarding ethnicity was limited due to the retrospective nature of the study and use of electronic medical records. Clinical characteristics looked at were route of drug administration, last known use of the drug, symptoms on admission, physical exam findings, laboratory data, admission and discharge diagnosis, medical history, and social history. All data was collected and analyzed by a team of medical students, resident physicians, and faculty physicians.

Patients were separated into one of three categories: heroin use only, cocaine use only, or use of both cocaine and heroin. Patients were then further broken down into groups based on the route of drug administration: intranasal, injection, or a combination of intranasal and injection. The intranasal group included those who snorted and/or smoked the drug. The injection group included patients who injected plus patients who employed subcutaneous or intradermal injection of drugs. All data was added to the substance abuse database by an investigator and descriptive statistics were calculated using Microsoft Excel.

RESULTS

Over a 44-month period of time, 2531 patients were admitted to the hospital with a history of drug use and/or had just used prior to the current admission. Of the 2531 patients, 1672 (66%) admitted to using an illicit substance within the week prior to presenting to the emergency room, 166 (7%) admitted to use in the last 6 months, and 277

(11%) said their last use of any illicit substance was more than 6 months prior to presentation. For 432 patients (17%), there was no specified time frame for their last use of any illicit substance. Most patients (1797 patients, 71%) were under the age of 50 years, with the largest group being 40 to 49 years of age (1184 patients, 47%) (Figure 1). The next largest group that used illicit substances were aged 50 to 59 years (597 patients, 24%). Of the patients, 64% (n=1612) of patients were male and 75% (n=1897) were African-American (Table 1).

Figure 1

Figure 1. Patient Age Distribution

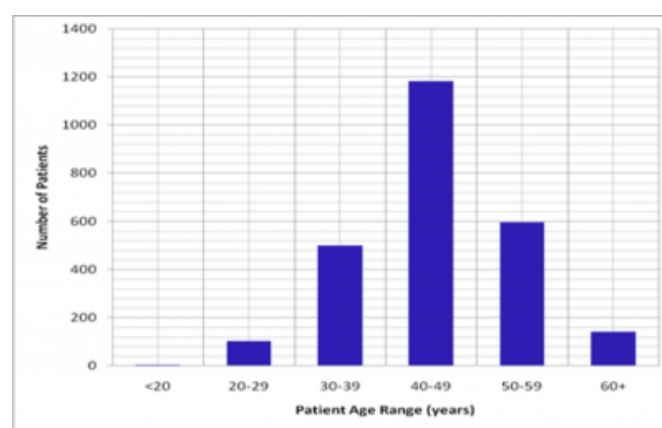


Figure 2

Table 1. Selected demographic characteristics of patients abusing illicit substances (n = 2531)

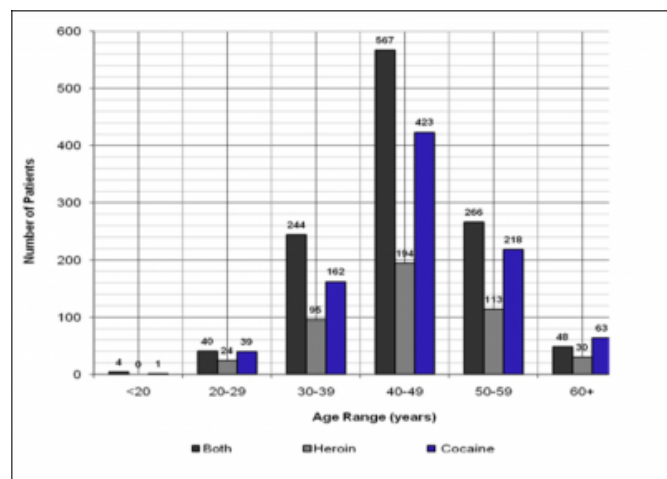
Characteristics	Values
Mean Age, years	45
Age Range, years	16 - 79
Female, %	36
Caucasian, %	16
Race undocumented, %	9
Patients ≥ 60 years, %	6

Of those who used only cocaine or only heroin, cocaine use was reported twice as frequently (n=906, 36%) as heroin use (n=456, 18%). Forty-six percent (1169 patients) admitted to using both cocaine and heroin. In each age range, more patients reported using both heroin and cocaine (Figure 2). However, when comparing cocaine use to heroin use individually, more patients admitted that cocaine was their drug of choice in every age range. Specifically looking at the 40 to 49 age range, over 550 admitted to using both drugs,

over 400 admitted to cocaine use, and almost 200 admitted to heroin use.

Figure 3

Figure 2. Illicit drug of choice used by age range



Concerning the route of administration of the drug, 772 (31%) injected only, 705 (28%) used them intranasally, and 110 (4%) admitted to both intranasal and injection drug abuse; 940 (37%) did not have their route of use documented upon presentation to the emergency room. After excluding those who did not have a documented route of administration, of those who practiced injection drug use only, 69% of heroin users injected (190 injectors of the total 276 heroin-only users) whereas only 19% injected cocaine (96 injectors of the total 497 cocaine-only users). By far, intranasal use of cocaine was the most common route of administration for that drug (380 patients, 77%). However, those who used both cocaine and heroin more commonly reported injection drug use (486 patients, 60%) versus any other route of administration.

Of the injection drug users, 491 (56%) had Hepatitis C, 102 (11%) had Hepatitis B, 304 (34%) had HIV, and 285 (32%) had none of these viral infections. Of patients who injected, 87 (10%) were infected with HIV alone and 28% (n=245) were infected with Hepatitis C alone. Hepatitis B alone was seen in only 1% (n=10) of the injecting study population. Five percent (45 patients) were co-infected with all three viral diseases. Of the injection drug users 163 (19%) were co-infected with both HIV and Hepatitis C, 38 (4%) with Hepatitis B and C, and 9 (1%) with Hepatitis B and HIV.

Of the 2531 patients admitted with illicit drug use, 367 (15%) presented with physical signs of a possible bacterial infection. Of the 367 patients, 174 (47%) admitted to

injection drug use only and 26 (7%) admitted to using both injection and intranasal practices. Specifically looking at the discharge diagnoses for these patients, 22 patients (0.87%) were diagnosed with suppurative back infections which included vertebral osteomyelitis, epidural/paraspinal abscesses, pyomyositis, and/or diskitis. The two most common back infection diagnoses were vertebral osteomyelitis (n=10, 46%) and back abscesses (n=10, 46%). Of these patients, 18% (n=4) were discharged with a diagnosis of vertebral disk disease. Of particular interest, 9% (n=2) ended up with a diagnosis of pyomyositis. Concerning these subclasses of back infections, 3 patients were diagnosed with one or more of these as their final diagnosis. Forty-one patients (1.62%) had endocarditis with or without septic emboli, 44 (1.7%) had deep abscesses not related to local injection or spinal infection, 12 (0.5%) had septic arthritis, and 144 (5.7%) had generalized bacteremia/sepsis. In all discharge diagnosis categories (except for patients with generalized bacteremia) more than half of the patients were current injection drug users (Table 2).

Figure 4

Table 2. Bacterial infections in injection drug users

	Total number of cases	% of current, acknowledged IDUs*	Mean Age	Age range
Back Infections	22	55	47	32-68
Endocarditis	41	59	45	21-68
Deep Abscess	44	52	44	18-60
Septic Arthritis	12	58	42	31-57
Generalized Bacteremia	144	42	44	20-66

* IDU = injection drug user

DISCUSSION

The current data suggest that in our inner city community hospital setting, past or current use of illegal drugs (especially through injection practices), may signal the need for suspicion of viral and bacterial infection that may require further testing and treatment. In our population, which is largely African-American (75%), Hepatitis B, Hepatitis C, and human immunodeficiency virus (HIV) were common viral infections found in injection drug users. Bacterial infections observed in injection drug users included vertebral osteomyelitis, pyomyositis, endocarditis, paraspinal abscesses, and generalized bacteremia. While it is suspected that most patients presenting with these diseases are usually younger in age, our study population showed that most drug

users included in the study were 40 to 49 years of age. Moreover, the next largest group of users was 50 to 59 years old. These data suggest that common stereotypes of younger populations being more avid drug users might not be valid in the inner city setting. By quickly identifying patients potentially at risk for serious bacterial and viral complications, these concerns can be addressed in a timely manner and may result in shorter hospital stays, lower healthcare costs, and overall better quality of life.

Injection drug users seem to have a greater predisposition for infection of the axial skeleton, especially at a younger age, than the non-addicted population; the axial skeleton includes the vertebral column, sternoclavicular joint, sternochondral joint, costochondral joint, sacroiliac joint, and pubic symphysis⁵. Spinal infections, such as vertebral osteomyelitis, abscesses, and diskitis, are common complications of injection drug use and can be spread hematogenously, via direct trauma, or from contiguous soft tissues. The signs and symptoms of these spinal infections are quite innocuous, such as back pain and tenderness, and could easily be overlooked. Therefore, one must possess a high index of suspicion to allow for correct testing in a timely manner. Pyomyositis, usually seen in tropical climates and the immunocompromised in temperate climates, can also be a potential complication due to injection drug use leading to deep muscle abscesses^{8,9}.

Septic arthritis is also a complication associated with injection drug use and can also have an insidious onset presenting with localized pain, swelling, and tenderness at the site. Again, a high index of suspicion is needed and proper history should be obtained in patients who inject illicit drugs to determine the cause and the course of treatment needed. Right-sided infective endocarditis is also frequently seen in injection drug users¹⁰. Drug users are more likely to present earlier than those who do not use drugs for medical assessment after the onset of symptoms, which can include fever and chest pain¹¹.

Viral infections are also commonly transmitted as a result of injection drug use. The most frequent viral complications include Hepatitis B, Hepatitis C, and HIV¹², which are chronic infectious diseases. Injection drug users make up the largest group of people infected with Hepatitis C in the United States¹³. This is due to the fact that it is communicable by sharing needles and has also been found in high concentrations on utensils used in the preparation of the drug to be injected^{14,15,16}. Infection may also be spread by

impulsive sexual activity in this population¹⁷. With HIV and Hepatitis C having similar transmission pathways, co-infection with both diseases occurs frequently, especially in injection drug users. A study done by Maier & Wu (2002) estimated that as many as 90 to 95% of injection drug users are co-infected with both viral diseases¹⁸.

Skin and soft tissue infections are a very common outcome of injection drug use. These infections, along with viral infections such as Hepatitis B, Hepatitis C, and HIV, are frequent manifestations leading to an increase in emergency department visits and hospitalization rates for injection drug abusers^{19,20,21}. Upon presentation, these diagnoses may be missed due to the relatively non-specific presenting signs and symptoms and therefore may delay proper testing, imaging, and treatment. By asking the appropriate questions upon presentation to the emergency room and delving further into the details of use of any illicit drug, this can lead to a more accurate diagnosis and better treatment options early on. We found that a certain few bacterial and viral infections are more likely to be linked to injection drug use and therefore must be a part of the differential diagnosis.

Several limitations should be considered with respect to this study. This study focuses solely on the illicit drug abusing population in Baltimore Maryland who present themselves to one community hospital and therefore may not be representative of illicit drug users elsewhere. We were unable to track any medical admissions to other area hospitals which could have pertained to this study. Since this was a retrospective study and done through revision of electronic medical records, the ethnicity profiles were very limited in their descriptions of the population at hand. Another limitation is only descriptive statistics are presented and finally, this study is not a comparison between illicit drug users and non-drug users. Additional comparative studies would be needed to look at the incidence of the bacterial and viral diseases in those who do not use illicit substances.

In conclusion, these findings suggest that a diagnosis of illicit drug use in the inner city community hospital setting signal the need for suspicion of viral and bacterial infection requiring further testing and treatment. These diseases could be termed "Injection Indicator Diseases" as they are more likely to be seen in those presenting with injection practices. Patients in our study population presenting with illicit drug use and viral or bacterial infections were largely in their 40s, but the next largest group was patients in their 50s.

Clinicians and patients may benefit from increased vigilance for these serious infections in the illicit drug-using population, especially in the inner city community hospital setting with high demand for scarce resources.

DISCLOSURES

This manuscript has been read and approved by all authors. This paper is unique and not under consideration by any other publication and has not been published elsewhere. The authors and peer reviewers report no conflicts of interest. The authors confirm that they have permission to reproduce any copyrighted material.

ACKNOWLEDGEMENTS

We would like to acknowledge Susan Hersker Rubinstein MD, Taraneh Mehrani MD, Lyn Camire MA ELS, Lindsay Quade, Sarah Sharfstein, Todd Burstyn, Danielle York, Gerald Gantt, and Ronald Lee for their contributions to this study.

References

1. Substance Abuse and Mental Health Services Administration. Results from the 2009 National Survey on Drug Use and Health: Volume I. Summary of National Findings (Office of Applied Studies, NSDUH Series H-38-A, HHS Publication No. SMA 10-4586Findings). Rockville, MD, 2010.
2. Substance Abuse Management Information Systems. Total number of treatment admissions and number of mentions for specific substances of abuse at admission, by age group and fiscal year, Baltimore City, fiscal years 1999-2003. Center for Substance Abuse Research (CESAR) 2004. Available at: http://www.cesar.umd.edu/cesar/county/dcs.asp?county=balt_city
3. Ebricht JR, Pieper B. Skin and soft tissue infections in injection drug users. *Infectious Disease Clinics of North America* 2002; 16(3): 697-712.
4. Orangio GR, Pitlick SD, Della Latta P, et al. Soft tissue infection in parenteral drug abusers. *Annals of Surgery* 1984;199: 97-100.
5. Kak V, Chandrasekar PH. Bone and joint infections in injection drug users. *Infectious Disease Clinics of North America* 2002; 16(3): 681-695.
6. Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality. Drug Abuse Warning Network, 2008: National Estimates of Drug-Related Emergency Department Visits. HHS Publication No. SMA 11-4618, Rockville, MD, 2011.
7. Garfein R, Vlahov D, Galai N, et al. Viral infections in short-term injection drug users: the prevalence of the hepatitis C, hepatitis B, and human immunodeficiency, and human T-lymphotropic viruses. *American Journal of Public Health* 1996; 86(5): 655-661.
8. Lopez FA, Lartchenko S. Skin and soft tissues infections. *Infectious Disease Clinics of North America* 2006; 20: 759-772.
9. Small LN, Ross JJ. Tropical and temperate pyomyositis. *Infectious Disease Clinics of North America* 2005; 19 (4): 981-989.
10. Moss R, Munt B. Injection drug use and right sided endocarditis. *Heart*. 2003; 89: 577-581.
11. Brown PD, Levine DP. Infective endocarditis in the injection drug user. *Infectious Disease Clinics of North America* 2001; 16: 645-665.
12. Lemberg BD, Shaw-Stiffel TA. Hepatic disease in injection drug users. *Infectious Disease Clinics of North America* 2002; 16(3): 667-679.
13. Backmund M, Reimer J, Meyer K, et al. Hepatitis C Virus Infection and Injection Drug Users: Prevention, Risk Factors, and Treatment. *Clinical Infectious Diseases* 2005; 40:S330-335.
14. Hagan H, Thiede H, Weiss NS, et al.. Sharing of drug preparation equipment as a risk factor for Hepatitis C. *American Journal of Public Health* 2001; 91:42-6.
15. Hahn JA, Page-Shafer K, Lum PJ, et al. Hepatitis C seroconversion among young injection drug users: relationships and risks. *Journal of Infectious Diseases* 2002; 186: 1558-64.
16. Thorpe LE, Ouellet LJ, Hershow R, et al. Risk of Hepatitis C virus infection among young adult injection drug users who share injection equipment. *American Journal of Epidemiology* 2002; 155: 645-653.
17. Khalsa JH, Treisman G, McCance-Katz E, et al. Medical consequences of drug abuse and co-occurring infections: Research at the National Institute on Drug Abuse. *Substance Abuse* 2008; 29(3): 5-16.
18. Maier I, Wu GY. Hepatitis C and HIV co-infection: a review. *World Journal of Gastroenterology* 2002; 8: 577-579.
19. Cherubin CE, Sapira JD. The medical complications of drug addiction and the medical assessment of the intravenous drug user: 25 years later. *Annals of Internal Medicine* 1993; 119: 1017-1028.
20. Stein MD. Injected-drug use: complications and costs in the care of hospitalized HIV infected patients. *Journal of Acquired Immune Deficiency Syndrome* 1994; 7:469-473.
21. Stein MD, Sobota M. Injection drug users: hospital care and charges. *Drug and Alcohol Dependence* 2001; 64:117-120.

Author Information

Charmian D. Sittambalam, MD

Department of Internal Medicine, Union Memorial Hospital

Robert P. Ferguson, MD FACP

Department of Internal Medicine, Union Memorial Hospital